

REMARKS

This application has been reviewed in light of the Office Action dated May 11, 2007. Claims 13-15, 17, 20-22, 24, 27 and 28 are presented for examination, of which Claims 13, 20, 27 and 28 are in independent form. Claims 13-15, 17, 20-22, 24, 27 and 28 have been amended to define still more clearly what Applicant regards as his invention. Favorable reconsideration is requested.

The Examiner has objected to the drawings under 37 CFR 1.83(a) on the ground that they fail to show every feature of the invention specified in the claims for the reasons set forth on pages 2-3 of the Office Action. As to Claim 13, the decision step, as amended, corresponds to the “SHADOW DEFINITION INPUT UNIT” as shown in at least Fig. 14 and is supported by at least paragraphs [0122] and [0123] of the specification. The image processing step of Claim 13 (and Claim 15) corresponds to “LUT1” and “LUT2” of the “DIFFERENCE PROCESSING UNIT” as shown in at least Fig. 14, and is supported by at least paragraphs [0121]-[0124] and [0139] of the specification. The computing step of Claim 13 corresponds to “LUT3”, “LUT4” and the “ADDING UNIT” of the “DIFFERENCE PROCESSING UNIT” as shown in at least Fig. 14, and is supported by at least paragraph [0140] of the specification.

As to Claim 14, the image attributes acquisition step, as amended, corresponds to the “CONTROL UNIT” as shown in Fig. 14, and is supported by at least paragraph [0121] of the specification.

Claim 17 is supported by at least Fig. 2 (see S100), Fig. 14 and at least paragraph [0096] of the specification.

Claims 20-22, 24, 27 and 28 are all apparatus, computer program and computer

storage medium claims corresponding to method Claims 13-15 and 17, and are supported by the Figures and specification as pointed with respect to Claims 13-15 and 17.

The Office Action states that the title of the invention is not descriptive. The title has been amended to read as follows:

--IMAGE PROCESSING APPARATUS, IMAGE PROCESSING METHOD,
PROGRAM AND RECORDING MEDIUM FOR GENERATING A DIFFERENCE IMAGE
FROM A FIRST RADIOGRAPHIC IMAGE AND A SECOND RADIOGRAPHIC IMAGE--.

Applicant respectfully submits that the title, as amended, is clearly indicative of the invention to which the claims are directed.

The Examiner has objected to the specification as failing to provide proper antecedent basis for the claimed subject matter. Applicant submits that the specification clearly describes the features of the claims, as discussed in detail above.

Claims 13-15, 17, 20-22, 24, 27 and 28 were rejected under the second paragraph of 35 U.S.C. § 112, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the Office Action states that Claim 13's recitation to "display a shadow change region of the difference image as a negative image or a positive image" conflicts with "changing the first image and/or the second image into the negative image or the positive image." The claims have been carefully reviewed and amended as deemed necessary to ensure that they conform fully to the requirements of Section 112, second paragraph, with special attention to the points raised in the Office Action. It is believed that the rejection under Section 112, second paragraph, has been obviated, and its withdrawal is, therefore, respectfully requested.

Claims 13-15, 17, 20-22, 24, 27 and 28 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,215,848 (Linders) in view of U.S. Patent No. 5,999,652 (Bushman).

As shown above, Applicant has amended independent Claims 13, 20, 27 and 28 in terms that more clearly define what he regards as his invention. Applicant submits that these amended independent claims, together with the remaining claims dependent thereon, are patentably distinct from the cited prior art for at least the following reasons.

Claim 13 is directed to an image processing method for generating a difference image from a first radiographic image and a second radiographic image. The method includes: (1) a decision step, of deciding which one of a shadow increase region or a shadow decrease region of the difference image of the first radiographic image and the second radiographic image is to be displayed as a high-concentration region or a low-concentration region; (2) an image processing step, of changing the first radiographic image and/or the second radiographic image into a negative image or a positive image based on the decision in the decision step; and (3) a computing step, of computing a difference image from the first radiographic image and the second radiographic image changed in the image processing step.

As discussed in the specification, a negative image and a positive image may be mixed when acquiring a plurality of radiographic images. The difference image of the radiographic images may be calculated based on the radiographic images when diagnosing. However, it is difficult to calculate the difference image appropriately when the negative image and the positive image are mixed. Among other notable features of Claim 13 are: (1) a decision step, of deciding which one of a shadow increase region or a shadow decrease region of the

difference image of the first radiographic image and the second radiographic image is to be displayed as a high-concentration region or a low-concentration region; (2) an image processing step, of changing the first radiographic image and/or the second radiographic image into a negative image or a positive image based on the decision in the decision step. By virtue of the structure recited in Claim 13, the shadow of the difference image can be represented appropriately, even though the negative image and the positive image are mixed.

Linders relates to a method for forming an assembled image from successive sub-images of different parts of an object. Linders discusses that brightness values of individual difference images represent differences between corresponding brightness values of successive images, such as X-ray images. For example, when successive images are formed by irradiating a patient after a contrast medium is injected into the patient's vascular system, the difference images show a double contrast which reproduces the progression of the contrast medium in the blood vessels of the patient. At the area where contrast medium is reproduced in the last X-ray image formed but not yet in the corresponding part of the preceding X-ray image, for example, high grey values are formed. At the area where a concentration of contrast medium is reproduced in the preceding X-ray image which is higher than that in the corresponding part of the last X-ray image formed, low grey values are formed. Linders further discusses that "[i]t will be evident to those skilled in the art that high and low grey values can be interchanged, because the negative image actually contains the same information as the corresponding positive image." However, Linders fails to teach or suggest on which image the interchanging of high and low values is performed. Thus, Applicant has found nothing in Linders that would teach or suggest "a decision step, of deciding which one of a shadow increase region or a shadow decrease region of the

difference image of the first radiographic image and the second radiographic image is to be displayed as a high-concentration region or a low-concentration region” or “an image processing step, of changing the first radiographic image and/or the second radiographic image into a negative image or a positive image based on the decision in said decision step,” as recited in Claim 13.

Bushman does not remedy the deficiencies of Linders. Bushman relates to a method and system of image modulation detection of an aircraft or missile exhaust plume by subtracting one sequential picture image obtained of a field of view in which the object is located from the next sequential picture image. Bushman discusses two different methods for subtracting images, i.e. that the differential picture image may be detailed by either (1) a mathematical subtraction of pixel values or (2) by making one frame a negative image and adding the negative frame to a next positive image in the sequence of frames. However, Applicant has found nothing in Bushman that would teach or suggest “a decision step, of deciding which one of a shadow increase region or a shadow decrease region of the difference image of the first radiographic image and the second radiographic image is to be displayed as a high-concentration region or a low-concentration region” or “an image processing step, of changing the first radiographic image and/or the second radiographic image into a negative image or a positive image based on the decision in said decision step,” as recited in Claim 13.

Accordingly, Applicant submits that Claim 13 is patentable over Linders and Bushman, whether considered separately or in any permissible combination (if any).

A review of the other art of record has failed to reveal anything which, in Applicant’s opinion, would remedy the deficiencies of the art discussed above, as a reference

against Claim 13.

Independent Claims 20, 27 and 28 are apparatus, computer program and computer storage medium claims, respectively, corresponding to method Claim 13, and are believed to be patentable the cited prior art for at least the same reasons as discussed above in connection with Claim 13.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and early passage to issue of the continued application.

Applicant's undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,

/Jennifer A. Reda/
Jennifer A. Reda
Attorney for Applicant
Registration No.: 57,840

FITZPATRICK, CELLA, HARPER & SCINTO
30 Rockefeller Plaza
New York, New York 10112-3801
Facsimile: (212) 218-2200